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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/055,201	04/03/1998	WILLIAM BROWN	933.P1/MXP/R	3603

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APPLIED MATERIALS, INC.
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SANTA CLARA, CA 95050

EXAMINER	
ZERVIGON, RUDY	
ART UNIT	**PAPER NUMBER**
1763	

DATE MAILED: 04/06/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/055,201	BROWN ET AL.	
	Examiner	Art Unit	
	Rudy Zervigon	1763	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 05 January 2004.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-6,9-11,14,15,17-24,26-38,40-62,64-73 and 75-86 is/are pending in the application.

4a) Of the above claim(s) 17-23 is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-6,9-11,14,15,24,26-38,40-62,64-73 and 75-86 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1, 6, 9, 24, 31, 35, 56, 59-61, 77, 79, 80, and 86 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ole D. Krogh (USPat. 5,453,125) in view of Foster et al (USPat. 5,567,243). Krogh teaches a process chamber (16, Figure 2; column 7, lines 22-51) for processing a substrate (17, Figure 2; column 7, lines 22-51) in a process gas (column 7, line 40-45) and reducing emissions of hazardous gas to the environment (column 3, line 38 – column 4, line 36), the process chamber comprising:

i. A support capable of supporting the substrate (17, Figure 2)

ii. A gas distributor (18) capable of introducing process gas into the process chamber

iii. An exhaust tube (7, 1, 8; Figure 1) through which the effluent may be flowed, the exhaust tube (7, 1, 8; Figure 1) comprises an inlet (upstream end) and an outlet (downstream end) that are substantially facing each other in an opposing relationship

iv. The exhaust tube comprises sapphire (Al_2O_3 column 5, lines 39-45) and the exhaust tube, of sufficient length, and being adapted to provide a non-circuitous and non-turbulent flow of effluent there through by being substantially absent projections or recesses (Figure 1) that either alter the flow direction of the effluent to provide a circuitous flow of effluent through the exhaust tube or that cause turbulence in the flow of the effluent through the exhaust tube

v. A microwave (column 4, lines 26-33) energy applicator (column 6, lines 24-27) to couple microwave energy (column 4, lines 26-33) to the effluent flow, by a waveguide (column 4,

lines 65-67), through the exhaust tube to reduce the hazardous gas content of the effluent (column 6, lines 9-28)

vi. The exhaust tube comprises a cylinder (7 or 8) having an axis parallel to the direction of the flow of the effluent through the exhaust tube

vii. A reagent gas mixer (not shown) capable of mixing a reagent gas with the effluent (column 6, lines 21-24)

Krogh does not teach a process chamber with a gas activator capable of activating the process gas to perform a process in the process chamber. Krogh does not teach energy application in the RF frequency band (column 4, lines 26-33). Krogh only teaches sapphire comprising the exhaust tube. As a result, Krogh does not teach monocrystalline sapphire comprising the exhaust tube[1].

Foster teaches a process chamber (5, Figure 1) for processing a substrate (22) in a process gas (column 8, lines 33-65; column 10, lines 34-50). Foster further teaches a support (20) capable of supporting the substrate, a gas distributor (30) capable of introducing process gas into the process chamber, and a gas activator (24) capable of activating the process gas (column 8, lines 33-55) to perform a process in the process chamber.

Foster also teaches, in a second embodiment, a process chamber (40, Figure 2) for processing a substrate (48) in a process gas (column 13, lines 23-30). Foster further teaches a support (46) capable of supporting the substrate, a gas distributor (52) capable of introducing process gas into the process chamber, and an RF gas activator (57) capable of activating the process gas (column 14, lines 18-28) to perform a process in the process chamber.

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[1] http://www.matweb.com/

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Krogh to replace his process chamber with Foster's process chamber, for Krogh to optimize Krogh's energy frequency to be with in the RF frequency band, and for Krogh to replace the sapphire comprising the exhaust tube with monocrystalline sapphire. The replacement of the sapphire comprising the exhaust tube with monocrystalline sapphire is an equivalent replacement.

The motivation for replacing the generic processing chamber of Krogh with Foster's process chamber, and for Krogh to optimize Krogh's energy frequency to be with in the RF frequency band is to supply a specific processing chamber for the required but generically described process chamber of Krogh and for Krogh to optimize the operation of his energy applicator as taught by Krogh (column 4, lines 26-33).

3. Claims 10, 11, 15, 26, 27, 28, 29, 30, 40, 43-46, 49-54, 66, 69-71, 75, 76, 78, and 81-85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki (USPat. 5,352,902) in view of Ole D. Krogh (USPat. 5,453,125). Aoki teaches a plasma processing apparatus (1, Figure 4; column 4, line 57- end) including an exhaust tube ("discharge port", as part of optical system 3; Figure 4). Aoki further teaches:

i. A support capable of supporting the substrate (boat 14, Figure 2; column 3, lines 5-10)

ii. A gas distributor (20) capable of introducing process gas into the process chamber

iii. An exhaust tube (2) through which the effluent may be flowed

iv. A process chamber (1) with a gas activator (16, 17) capable of activating the process gas to perform a process in the process chamber (column 3, lines 5-41).

v. a gas analyzer (3, Figure 4; column 4, line 64 - column 5, line 50) capable of monitoring the gas content of the effluent and providing a signal ("electrical signals"; column 4, line 64 - column 5, line 50) in relation to the gas content of the effluent; and

vi. a computer controller (5B, Figure 4; column 5, lines 50-60; column 7, lines 18-29) system comprising a computer readable medium having computer readable program code embodied therein (5, Figure 4; column 5, lines 33-41), the computer controller (5B, Figure 4; column 5, lines 50-60; column 7, lines 18-29) system capable of monitoring the signal ("electrical signals"; column 4, line 64 - column 5, line 50) from the gas analyzer (3, Figure 4; column 4, line 64 - column 5, line 50; column 7, lines 4-17), is adapted in determining whether the gas content of the effluent exceeds a level (column 7, lines 25-29), and as a result performing at least one of the following:

vii. adjusting a power (column 5, lines 55-60) applied to an energy applicator (16, 17; "RF") to influence the hazardous gas content in the effluent,

viii. adjusting process conditions (20A; 20B; 16; 17; Figure 4; column 5, lines 51-60) in the process chamber to influence the hazardous gas content in the effluent,

ix. activating an alarm ("Step I-8"; Figure 6) or metering display

x. controlling the termination the process (column 8, lines 53-65)

Aoki does not teach a RF energy applicator to couple RF to the effluent in the exhaust tube to reduce the hazardous gas content of the effluent.

Ole D. Krogh is discussed above.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Aoki to use and control Ole D. Krogh's microwave (column 4, lines 26-33) energy applicator

to couple microwave energy (column 4, lines 26-33) to the effluent in the exhaust tube to reduce the hazardous gas content of the effluent.

Motivation for Aoki to use and control Ole D. Krogh's microwave energy applicator to couple microwaves to the effluent in the exhaust tube to reduce the hazardous gas content of the effluent is to reduce human toxicity of the effluent gas as taught by Krogh (column 3, lines 38-55).

4. Claims 11, 15, 26, 27, 28, 29, 30, 37, 38, 50-54, 64-66, 69-71, 76, and 78 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ole D. Krogh (USPat. 5,453,125) and Foster et al (USPat. 5,567,243), in view of Aoki (USPat. 5,352,902). Aoki, Ole D. Krogh, and Foster et al are discussed above. However, Ole D. Krogh and Foster et al do not teach:

i. a gas analyzer capable of monitoring the gas content of the effluent and providing a signal in relation to the gas content of the effluent; and

ii. a computer controller system comprising a computer readable medium having computer readable program code embodied therein, the computer controller system capable of monitoring the signal from the gas analyzer, determining whether the gas content of the effluent exceeds a level, performing at least one of the following:

iii. adjusting a power applied to an energy applicator to influence the hazardous gas content in the effluent,

iv. adjusting process conditions in the process chamber to influence the hazardous gas content in the effluent,

v. activating an alarm or metering display

Aoki further teaches:

vi. a gas analyzer (3, Figure 4; column 4, line 64 - column 5, line 50) capable of monitoring the gas content of the effluent and providing a signal ("electrical signals"; column 4, line 64 - column 5, line 50) in relation to the gas content of the effluent; and

vii. a computer controller (5B, Figure 4; column 5, lines 50-60; column 7, lines 18-29) system comprising a computer readable medium having computer readable program code embodied therein (5, Figure 4; column 5, lines 33-41), the computer controller (5B, Figure 4; column 5, lines 50-60; column 7, lines 18-29) system capable of monitoring the signal ("electrical signals"; column 4, line 64 - column 5, line 50) from the gas analyzer (3, Figure 4; column 4, line 64 - column 5, line 50; column 7, lines 4-17), determining whether the gas content of the effluent exceeds a level (column 7, lines 25-29), performing at least one of the following:

viii. adjusting a power (column 5, lines 55-60) applied to an energy applicator (16, 17; "RF") to influence the hazardous gas content in the effluent,

ix. adjusting process conditions (20A; 20B; 16; 17; Figure 4; column 5, lines 51-60) in the process chamber to influence the hazardous gas content in the effluent,

x. activating an alarm ("Step I-8"; Figure 6) or metering display

xi. terminating the process (column 8, lines 53-65)

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Ole D. Krogh and Foster to use Aoki's computer controller system.

Motivation for Ole D. Krogh and Foster to use Aoki's computer controller system is for automation and control of the plasma process (column 2, lines 13-34). It is further provided that computer automation of the plasma processes provides optimization of the processes. (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160

USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); MPEP 2144.05).

5. Claims 2-5, and 57-59 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ole D. Krogh (USPat. 5,453,125) in view of Foster et al (USPat. 5,567,243). Ole D. Krogh and Foster are discussed above. However, Krogh and Foster do not teach an exhaust tube comprising a length that is sufficiently long to provide a residence time of the effluent that is at least about 0.01 seconds. Krogh and Foster do not teach laminar flow through the exhaust tube.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Krogh to vary the length of the exhaust tube to provide a residence time of the effluent that is at least about 0.01 seconds, and for Krogh and Foster to provide a laminar flow through the exhaust tube by varying the flow rate of the effluent and/or reactant gas.

Motivation for Krogh and Foster to vary the length of the exhaust tube to provide a residence time of the effluent that is at least about 0.01 seconds and to provide a laminar flow is to optimize the destruction of the effluent gas (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); MPEP 2144.05). Furthermore, it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art.(Gardner v. TEC Systems, Inc. , 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied , 469 U.S. 830, 225 USPQ 232 (1984); In re Rose , 220 F.2d 459, 105

USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04).

6. Claims 41-43, 51, and 67-69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki (USPat. 5,352,902) and Ole D. Krogh (USPat. 5,453,125), as applied to claims 10, 11, and 26. However, Aoki and Krogh do not teach an exhaust tube comprising a length that is sufficiently long to provide a residence time of the effluent that is at least about 0.01 seconds. Aoki and Krogh do not teach laminar flow through the exhaust tube.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Aoki and Krogh to vary the length of the exhaust tube to provide a residence time of the effluent that is at least about 0.01 seconds, and for Aoki and Krogh to provide a laminar flow through the exhaust tube by varying the flow rate of the effluent and/or reactant gas.

Motivation for Aoki and Krogh to vary the length of the exhaust tube to provide a residence time of the effluent that is at least about 0.01 seconds and to provide a laminar flow is to optimize the destruction of the effluent gas (In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980); In re Hoeschele , 406 F.2d 1403, 160 USPQ 809 (CCPA 1969); Merck & Co. Inc . v. Biocraft Laboratories Inc. , 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied , 493 U.S. 975 (1989); In re Kulling , 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); MPEP 2144.05). Furthermore, it is well established that changes in apparatus dimensions are within the level of ordinary skill in the art.(Gardner v. TEC Systems, Inc. , 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied , 469 U.S. 830, 225 USPQ 232 (1984); In re Rose , 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); See MPEP 2144.04).

7. Claim 32 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ole D. Krogh (USPat. 5,453,125) and Foster et al (USPat. 5,567,243) in view of Maeba et al (USPat. 4,816,046). Krogh and Foster are discussed above. Krogh and Foster do not teach an RF energy applicator to couple RF energy to the effluent. Maeba teaches plasma CVD effluent gas treatment (column 3, lines 45-60; column 4, lines 58-65). Maeba teaches an RF energy applicator (34/35; Figure 10) to couple RF energy to the effluent (23). However, Maeba does not teach a gas distributor, a gas activator, or a substrate support.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Krogh and Foster to add Maeba's RF energy applicator to couple RF energy to the effluent. Motivation for Krogh and Foster to add Maeba's RF energy applicator to couple RF energy to the effluent is for limiting process gas condensation leading to clogging of the vacuum pump (column 5, lines 3-10).

8. Claims 14, 33, 34, 36, 48, and 73 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki (USPat. 5,352,902), Ole D. Krogh (USPat. 5,453,125), as applied to claims 10, 11 and 26 above, and further in view of Maeba et al (USPat. 4,816,046). Krogh further teaches a microwave (column 4, lines 26-33) energy applicator (column 6, lines 24-27) to couple microwave energy (column 4, lines 26-33) to the effluent flow, by a waveguide (column 4, lines 65-67), through the exhaust tube to reduce the hazardous gas content of the effluent (column 6, lines 9-28).

Aoki, and Krogh do not teach an RF energy applicator to couple RF energy to the effluent. Maeba teaches plasma CVD effluent gas treatment (column 3, lines 45-60; column 4, lines 58-65). Maeba teaches an RF energy applicator (34/35; Figure 10) to couple RF energy to the

effluent (23). However, Maeba does not teach a gas distributor, a gas activator, or a substrate support.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Aoki and Krogh to add Maeba's RF energy applicator to couple RF energy to the effluent.

Motivation for Aoki and Krogh to add Maeba's RF energy applicator to couple RF energy to the effluent is for limiting process gas condensation leading to clogging of the vacuum pump (column 5, lines 3-10).

9. Claims 47, 55, and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki (USPat. 5,352,902) in view of Ole D. Krogh (USPat. 5,453,125). Aoki and Ole D. Krogh are discussed above. However, Krogh only teaches sapphire comprising the exhaust tube. As a result, Krogh does not teach monocrystalline sapphire comprising the exhaust tube.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Aoki and Ole D. Krogh to replace the sapphire comprising the exhaust tube with monocrystalline sapphire.

The replacement of the sapphire comprising the exhaust tube with monocrystalline sapphire is an equivalent replacement.

10. Claim 62 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ole D. Krogh (USPat. 5,453,125) in view of Foster et al (USPat. 5,567,243). Ole D. Krogh and Foster are discussed above. However, Krogh only teaches sapphire comprising the exhaust tube. As a result, Krogh does not teach monocrystalline sapphire comprising the exhaust tube.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Ole D. Krogh and Foster to replace the sapphire comprising the exhaust tube with monocrystalline sapphire.

The replacement of the sapphire comprising the exhaust tube with monocrystalline sapphire is an equivalent replacement.

11. Claim 34 is rejected under 35 U.S.C. 103(a) as being unpatentable over Aoki (USPat. 5,352,902), Ole D. Krogh (USPat. 5,453,125), as applied to claim 11 above, and further in view of Maeba et al (USPat. 4,816,046). Aoki, and Krogh do not teach an RF energy applicator to couple RF energy to the effluent. Maeba teaches plasma CVD effluent gas treatment (column 3, lines 45-60; column 4, lines 58-65). Maeba teaches an RF energy applicator (34/35; Figure 10) to couple RF energy to the effluent (23). However, Maeba does not teach a gas distributor, a gas activator, or a substrate support.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Aoki and Krogh to add Maeba's RF energy applicator to couple RF energy to the effluent.

Motivation for Aoki and Krogh to add Maeba's RF energy applicator to couple RF energy to the effluent is for limiting process gas condensation leading to clogging of the vacuum pump (column 5, lines 3-10).

12. Claim 39 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ole D. Krogh (USPat. 5,453,125) and Foster et al (USPat. 5,567,243). Ole D. Krogh and Foster are discussed above. However, Krogh only teaches sapphire comprising the exhaust tube. As a result, Krogh does not teach monocrystalline sapphire comprising the exhaust tube.

It would have been obvious to one of ordinary skill in the art at the time the invention was made for Foster and Ole D. Krogh to replace the sapphire comprising the exhaust tube with monocrystalline sapphire.

The replacement of the sapphire comprising the exhaust tube with monocrystalline sapphire is an equivalent replacement.

Response to Arguments

13. Applicant's arguments filed January 5, 2004 have been fully considered but they are not persuasive.

14. Applicant states that Krogh does not teach "that the tube is substantially absent projections and recesses, and that has the RF energy applicator recited in part (e) that is adapted to couple RF energy to effluent in the exhaust tube.". The Examiner disagrees. Krogh clearly teaches that Krogh's tube (7, 1, 8; Figure 1) is substantially absent projections and recesses (Figure 1), and that has the energy applicator (column 6, lines 24-27) recited in part (e) that is adapted to couple energy to effluent in the exhaust tube (7, 1, 8; Figure 1). It is noted in the above rejections that Krogh's energy applicator (column 6, lines 24-27) is in the microwave frequency band and not in the radio frequency (RF) band.

15. Applicant equates "projections and recesses" to "square-shaped with square corners" to distinguish Krogh. The Examiner disagrees. Projections are surfaces projecting from another surface(s). Krogh does not show in Figure 1 surfaces projecting from another surface(s). Recesses are surfaces recessed from another surface(s). Krogh does not show in Figure 1 surfaces recessed from another surface(s).

16. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., "Krogh does not teach or suggest an apparatus that couples energy to a gas that is in the entrance conduit.") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

17. In response to Applicant's position that

"

Foster et al. does not make up for me deficiencies of Krogh because Foster et al. also does not teach or suggest the exhaust tube and energy applicator recited in the claim. Foster et al. discloses a microwave plasma source for generating an upstream reactant gas plasma from which the necessary radicals are drawn" (column 8. lines 10-12) to process a substrate in a downstream reactor. Thus, Foster et al. discloses a source that provides an energized gas to a process chamber, but Foster et al. does not teach or suggest an exhaust! tube through which effluent from a process chamber is exhausted, and that is substantiality absent projections or recesses, as recited in the claim. Foster et al. also does not teach or suggest an energy applicator that couples energy to gas in an exhaust tube to reduce the hazardous gas content. Furthermore, Foster et al. does not teach of suggest any benefits of coupling energy to an exhaust gas in an exhaust tube, such as reducing a hazardous gas content of the gas. Thus, as Krogh et al. does not teach or suggest coupling energy to gas in an exhaust tube substantially absent projections or recesses, and Foster et al. does not teach or suggest coupling therefrom are patentable over Krogh and Foster et al energy to an exhaust tube..

"

It is argued in the body of the rejected claims that Krogh teaches said limitations with the exception that Krogh does not teach a process chamber with a gas activator capable of activating the process gas to perform a process in the process chamber. Krogh does not teach energy application in the RF frequency band (column 4, lines 26-33). Krogh only teaches sapphire comprising the exhaust tube. As a result, Krogh does not teach monocrystalline sapphire comprising the exhaust tube.

Foster was specifically cited solely for the following teachings:

"

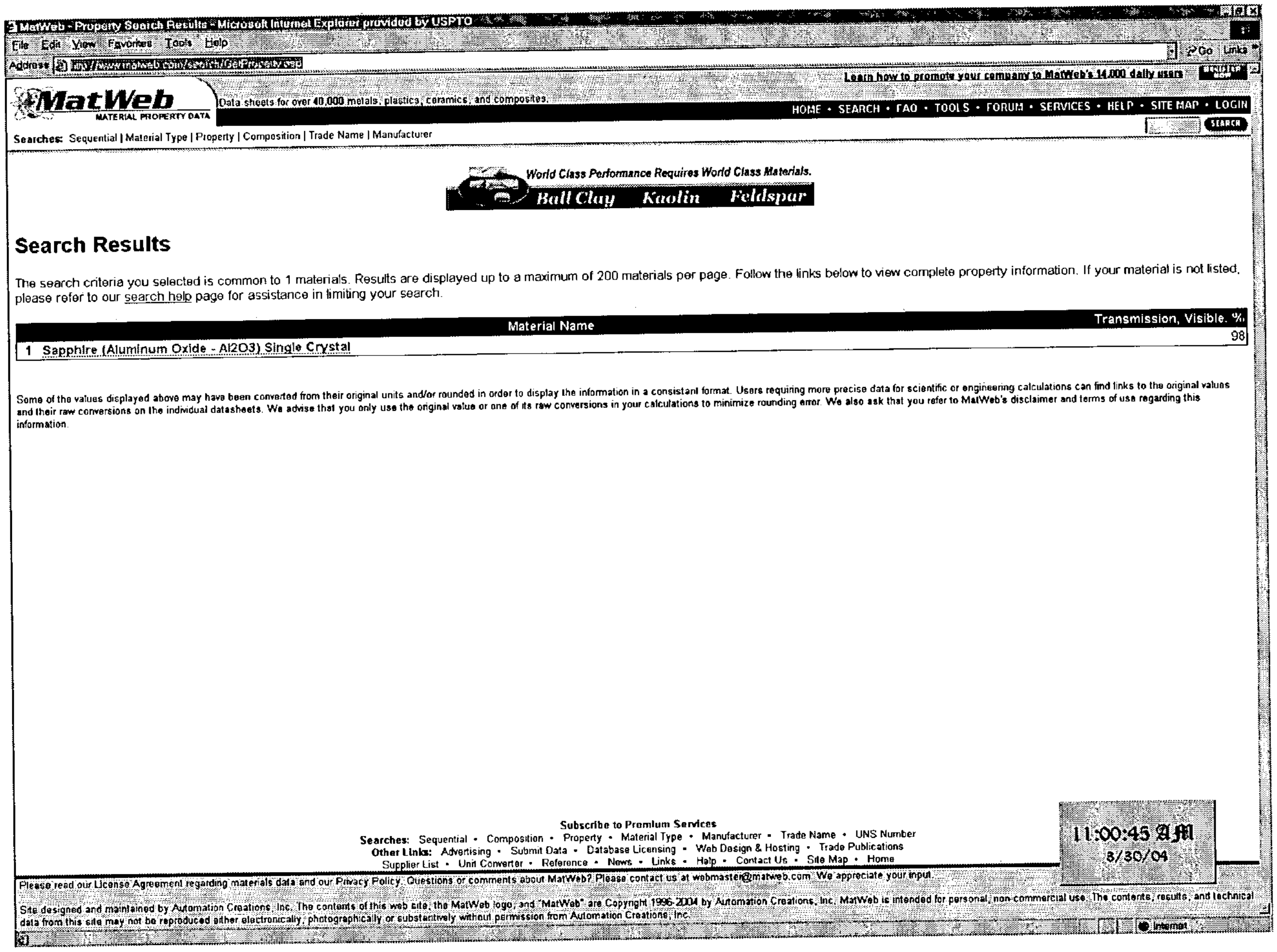
Foster teaches a process chamber (5, Figure 1) for processing a substrate (22) in a process gas (column 8, lines 33-65; column 10, lines 34-50). Foster further teaches a support (20) capable of supporting the substrate, a gas distributor (30) capable of introducing process gas into the process chamber, and a gas activator (24) capable of activating the process gas (column 8, lines 33-55) to perform a process in the process chamber.

Foster also teaches, in a second embodiment, a process chamber (40, Figure 2) for processing a substrate (48) in a process gas (column 13, lines 23-30). Foster further teaches a support (46) capable of supporting the substrate, a gas distributor (52) capable of introducing process gas into the process chamber, and an RF gas activator (57) capable of activating the process gas (column 14, lines 18-28) to perform a process in the process chamber.

"

18. Applicant states that the replacement of Krogh's sapphire comprising the exhaust tube with monocrystalline sapphire is not equivalent replacement because of crystallographic

differences. However, it is well appreciated that Krogh's choice of material for his microwave transmissive window is strictly based on the transmissive properties of his desired material. The Examiner argues that transmissive property differences between monocrystalline (single crystal) sapphire and Krogh's sapphire are neglegible if at all[1] above: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World Class Performance Requires World Class Materials. Ball Clay Kaolin Feldspar

Search Results

The search criteria you selected is common to 1 materials. Results are displayed up to a maximum of 200 materials per page. Follow the links below to view complete property information. If your material is not listed, please refer to our search help page for assistance in limiting your search.

Material Name	Transmission, Visible. %
1 Sapphire (Aluminum Oxide - Al2O3) Single Crystal	98

Some of the values displayed above may have been converted from their original units and/or rounded in order to display the information in a consistant format. Users requiring more precise data for scientific or engineering calculations can find links to the original values and their raw conversions on the individual datasheets. We advise that you only use the original value or one of its raw conversions in your calculations to minimize rounding error. We also ask that you refer to MatWeb's disclaimer and terms of use regarding this information.

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8/30/04

19. In response to Applicant's position that Krogh does not teach inlets and outlets that face each other is not convincing. Krogh specifically teaches an exhaust tube (7, 1, 8; Figure 1) through which the effluent may be flowed, the exhaust tube (7, 1, 8; Figure 1) comprises an inlet (upstream end) and an outlet (downstream end) that are substantially facing each other in an opposing relationship.

20. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., Krogh's inlet and outlet are not facing each other because "the conduits are vertically separated") are not recited in the rejected claims. Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

21. Applicant states on page 35 that Aoki does not teach a control/computation unit that detects conditions indicative of an endpoint and ends the etching process is different from a computer controller of the present invention. However, Aoki clearly provides a computer controller capable of conducting Applicant's function of process control including, for example, "safety operational program code" (see Aoki above). When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

22. Specifically, Aoki's computer controller is capable of performing the claimed "safety level" operation. According to Aoki:

"

The controlling device 5 comprises a data computing unit 51 for computing detection data, based on detection electric signals and reference electric signals, a reference data memory 52 for storing reference data indicating endpoints of the etching and the ashing which have been given beforehand as experimental data, and a control/computation unit 53 for comparing the detection data with the reference data, and when both agree with each other, producing and outputting a control signal.

" (column 5, lines 33-41).

Aoki's "detection data" being:

"

The data computing until 51 computes delection[2] data, based on the detection electric signal and the reference electric signal from the detection unit 4 (Step 1-6). The computed detection data may be values given by ratios of voltage values between the detection electric signal and the reference electric signal. The computed detection data is supplied to the control/computation unit 53. The control/computation unit 53 reads from a reference data memory 52 reference data indicative of an endpoint of the etching, and compares the detection data with the reference data to judge whether both data agree with each other (Step 1-7).

" (column 7, lines 18-29).

23. As such, Aoki can provide detection and comparison of "concentrations of produced gases contained in the exhaust gas are detected, and the detected concentration data and reference data are compared to continuously control and process the respective surface-treatments." as taught by Aoki (column 9, lines 27-38). Concretely, Aoki clearly provides a computer controller capable of conducting Applicant's function of process control including, for example, "safety operational program code" (see Aoki above). When the structure recited in the reference is substantially identical to that of the claims, claimed properties or functions are presumed to be inherent (In re Best, 562 F.2d 1252, 1255, 195 USPQ 430, 433 (CCPA 1977); MPEP 2112.01).

24. Applicant states:

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[2] Interpretted as "detection".

"

Furthermore, neither Aoki nor Krogh teach or suggest adding a reagent gas to the effluent if the hazardous gas content is determined to be too high. Aoki discloses that "reaction gases are fed from an etching gas source 20C or an ashing gas source 208 into the surface treatment device" (column 5, lines 51-53.) Thus, Aoki discloses feeding gases into a surface treatment device in which a substrate is processed, but does not teach or suggest adding a reagent gas to an effluent that has been exhausted from the substrate treatment device.

"

However, Applicant does not consider the Examiner's citation of Krogh of reagent gas mixer (not shown) capable of mixing a reagent gas with the effluent (column 6, lines 21-24):

"

For the purpose of abatement of perfluorinated compounds (PFC's) the effluent mixture entering through port 7 will in part consist of unreacted PFC's and in part of other gas additives and reaction products specific to the upstream activity. In addition, suitable reaction partners, e.g. oxygen and hydrogen, will be added to the effluent mixture in order to facilitate the conversion of the carbon in the PFC to CO_2 and the fluorine to HF. The microwave power supply (not shown) then generates microwaves which travel down the wave guide 3 and enter the chamber through window 2.

"

Conclusion

25. Applicant's amendment necessitated the new grounds of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

26. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Examiner Rudy Zervigon whose telephone number is (571) 272.1442. The examiner can normally be reached on a Monday through Thursday schedule from 8am through 7pm. The official after fax phone number for the 1763 art unit is (703) 872-9306. Any Inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Chemical and Materials Engineering art unit receptionist at (571) 272-1700. If the examiner can not be reached please contact the examiner's supervisor, Gregory L. Mills, at (571) 272-1439.

JEFFRIE R. LUND
PRIMARY EXAMINER